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ONTARIO WATER
RESOURCES COMMISSION

ANNUAL REPORT 1965

PARIS

water pollution control plant

DIVISION OF PLANT OPERATIONS
Ontario Water Resources Commission

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ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Members of the Paris Local Advisory Committee,
Town of Paris.

Gentlemen:

I am pleased to provide you with the 1965 Annual Report for the Paris Water Pollution Control Plant, OWRC Project No. 59-S-34.

We appreciate the co-operation you have extended to our Operations staff throughout the year, and trust that continuation of this close association will ensure even greater progress in the sphere of water pollution control.

Yours very truly,

D. S. Caverly,
General Manager.

ONTARIO WATER RESOURCES COMMISSION

801 BAY STREET

TORONTO 5

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CHAIRMAN

J. H. H. ROOT, M.P.P.
VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER

W. S. MacDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am pleased to provide you with the 1965 Annual Report on the operation of the Paris Water Pollution Control Plant, OWRC Project No. 59-S-34.

The report presents design data, outlines operating problems encountered during the year and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

This report provides useful information on the operating efficiency of this project during 1965. It is intended to act as a guide in gauging plant performance. To implement that aim, it includes detailed statistical and cost data, a description of the project and a summary of its operation during the year.

Of particular interest will be the cost data, which show the total cost to the municipality and the areas of major expenditure.

The Regional Operations Engineer is primarily responsible for the preparation of the report, and has compiled and arranged the material. He will be pleased to answer any questions regarding it. Other groups, however, were involved in the production, and these include the statistics section, the Drafting Section of the Division of Sanitary Engineering and the Division of Finance.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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PARIS
water pollution control plant

operated for

THE TOWN OF PARIS

by the

ONTARIO WATER RESOURCES COMMISSION

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VICE-CHAIRMAN: J. H. H. Root, M.P.P.

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F. A. Voege — A. K. Watt

COMMISSION SECRETARY

W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

DIRECTOR: B. C. Palmer

Assistant Director: C. W. Perry
Regional Supervisor: A. C. Beattie
Operations Engineer: P. J. Osmond

801 Bay Street Toronto 5

'65 REVIEW

Total operating cost for the year was $8,109.72 representing a cost per million gallons treated of $54.16. The cost to the average family during the year for operation was $5.26.

The average daily flow for the year of 410,000 gallons represents 82% of design capacity. Raw sewage strengths averaged 95% and 102% of the design BOD and SS respectively and 95% of the BOD and 82% of the SS were removed in the plant.

Ice forming on the aerator cones continued to be a problem during the winter. Considerable effort was expended by the chief operator to keep ice damage at a minimum. This problem has existed for the past three years. However, it has become less severe as the flows and the sewage strengths increase. The only absolute solution to this problem now appears to be the enclosure of the aeration tanks to retain the latent heat of the sewage.

Problems with fine wool particles and high strength paper wastes were successfully resolved. Strong dyes from the local textile plant continue to give the plant a black appearance. However, these do not seriously affect treatment.

Mechanical and electrical inspections of the equipment were carried out by head office Maintenance staff. The plant also had a detailed safety inspection by the head office Safety Officer.

Nineteen sixty-five also saw the completion of an addition to the plant to serve as a storage area for equipment.

GLOSSARY

BOD	biochemical oxygen demand (a measure of organic content)
cfm	cubic feet per minute
comminution	shredding of solids into small fragments
DWF	dry weather flow
effluent	outflow
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpcd	gallons per capita per day
gpm	gallons per minute
grit	sand, dust, stones, cinders and other heavy inorganic material
influent	inflow
lin. ft.	lineal feet
mgd	million gallons per day
mlss	mixed liquor suspended solids
ppm	parts per million
ss	suspended solids
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)

HISTORY
1959 - 1965

INCEPTION

In April 1959, the Town of Paris in co-operation with the OWRC initiated plans for the construction of a modern water pollution control plant. The firm of J. D. Lee and Company Limited, Consulting Engineers was engaged to prepare plans and specifications for the project.

APPROVAL

In January 1962, the Town signed an agreement with the OWRC to finance, construct and operate the plant. Financing was in conjunction with the CMHC.

CONSTRUCTION

Kedrosky Contractors Limited of Galt began construction in February 1962 on the plant and outfall sewer (Contract A). Johnson Bros. Company Limited, Brantford, commenced construction in February 1962 on the sanitary sewers and pumping station.

The Division of Plant Operations assumed operation of the project in February 1963.

TOTAL COST - $725,992.30 (December 31, 1965)

Project Staff

Chief Operator: H. Nelles

COMMENTS

The Paris plant is operated by a single operator with supervision and technical assistance from the OWRC head office. Casual help is supplied from the town forces when required during excessive load periods, holidays, sickness or training courses.

Supervision at the plant is based on 40 hours per week, 36 occurring from Monday to Friday inclusive and 2 hours each on Saturday and Sunday.

In April 1965, Mr. Nelles attended a three-day Chief Operators' Conference at the OWRC Laboratory in Toronto. This annual conference is sponsored by the OWRC, Division of Plant Operations. Also during 1965, Mr. Nelles received his Certificate of Qualification as a sewage works operator. This certificate is issued on the successful completion of three, one week courses again sponsored by the OWRC.

Description of Project

GENERAL

Domestic and industrial waste water is transmitted to the Water Pollution Control Plant via sanitary trunk sewers from the western region of the town and via forcemain from the Willow Street pumping station from the eastern region of town.

INFLUENT WORKS

Sewage enters the plant through a 24" diameter sewer and flows directly to one of two grit chambers, each equipped with a proportional weir, where heavy inorganic solids such as sand are removed. The flow then passes through a comminutor or shredding device which shreds or cuts up the organic solids. A bypass channel equipped with a bar screen is provided for use when it is necessary to service the comminutor. From this point the sewage flows to a wet well from which it is pumped to the aeration section for further treatment.

AERATION

Sewage enters the 2 rectangular aeration tanks where it is mixed with activated sludge returned from the final sedimentation tank. The mixture, called mixed liquor, is retained in the tanks for approximately 18 hours and is continuously agitated by any of six mechanical aerators.

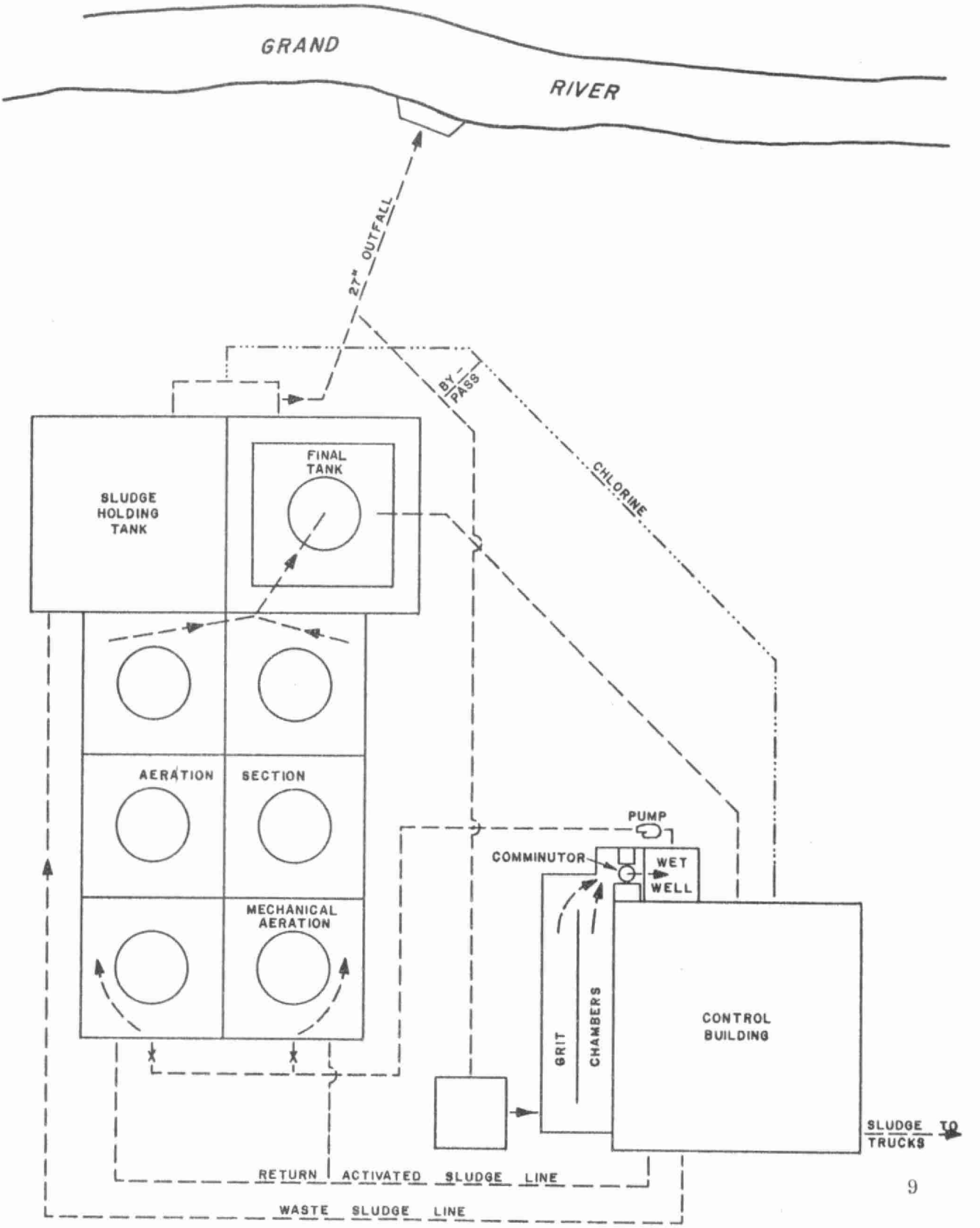
During this period a biological process takes place. Dissolved, colloidal and suspended material is broken down by bacterial action and rendered inert.

FINAL SEDIMENTATION

The aerated mixed liquor flows from the aeration section and is retained in a final sedimentation tank for approximately 3 1/2 hours. Here the activated sludge and inert material settles to the bottom of the tank where it is collected by a rotary scraping mechanism, directed to a hopper and either pumped back to the aeration tank or to a sludge holding tank. The material in the sludge holding tank is further concentrated through settlement and supernating. The solids are then pumped from the bottom of the tank to a truck and hauled away to land disposal sites. The clear liquid or completely treated sewage then flows over the final tank to an outfall chamber were it is measured by a V-notch weir and disinfected by the addition of chlorine before it flows to the Grand River.

PARIS W.P.C.P.

FLOW DIAGRAM



PROJECT COSTS

NET CAPITAL COST (Estimated)		$725,992.30
DEDUCT - Portion Financed by CMHC (Final)	$365,238.90	
- Payments from Municipalities	34,000.00	399,238.90
Long Term Debt to OWRC		$326,753.40
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1965		$ 20,281.74
Net Operating		$ 8,109.72
Debt Retirement		7,156.00
Reserve		4,884.60
Interest Charged		18,859.56
TOTAL		$ 39,009.88

RESERVE ACCOUNT

Balance at January 1, 1965	$ 8,467.61
Deposited by Municipality	4,884.60
Interest Earned	573.48
	$ 13,925.69
Less Expenditures	(1,447.00)
Balance at December 31, 1965	$ 12,478.69

MONTHLY OPERATING COSTS

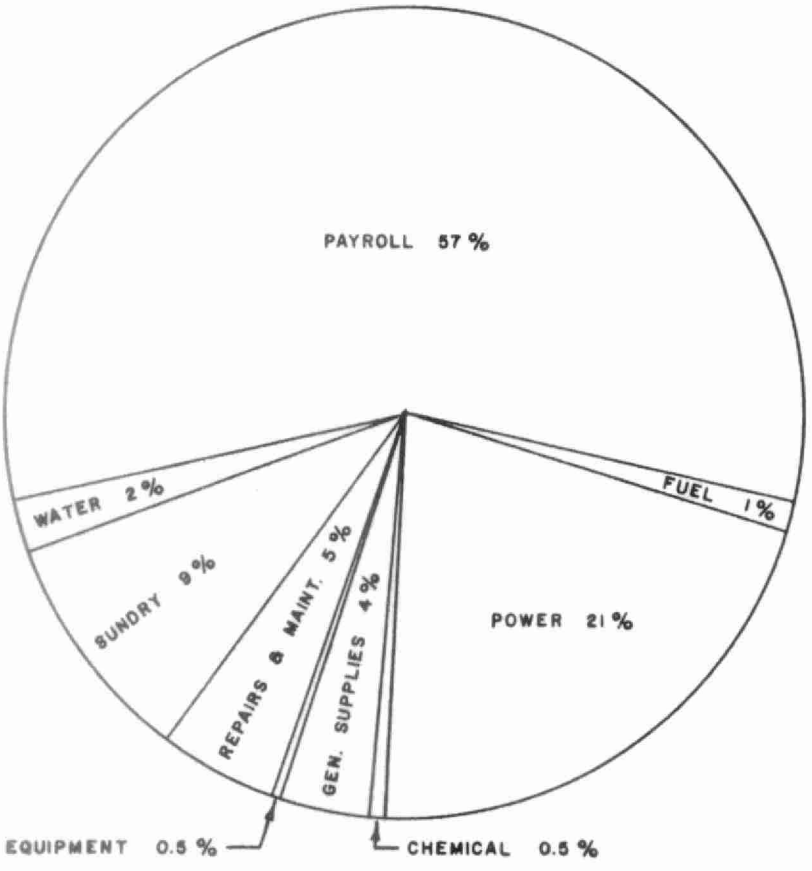
MONTH	TOTAL EXPENDITURE	PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY	WATER
JAN	368.42	328.64				12.25		10.55	16.98	
FEB	619.11	328.64	47.01	165.96		2.00			75.50	
MARCH	590.44	362.74		159.87		32.70			35.13	
APRIL	559.92	379.77		155.41		3.35			21.39	
MAY	930.21	511.23		146.53		60.03		126.60	85.82	
JUNE	563.13	340.82		143.85		26.93	1.36	3.70	46.47	
JULY	737.61	365.66		133.42	37.93	8.55		66.16	28.32	97.57
AUG	663.44	357.06		126.81		76.20	9.75		93.62	
SEPT	609.89	357.06		142.22		3.80	8.76	37.17	60.88	
OCT	831.14	535.59		139.39				118.36	37.80	
NOV	616.66	385.46		120.62		49.89			60.69	
DEC	1019.75	371.26	42.49	267.78		28.40		30.00	207.99	71.83
TOTAL	8109.72	4623.93	89.50	1701.86	37.93	304.10	19.87	392.54	770.59	169.40

YEARLY OPERATING COSTS

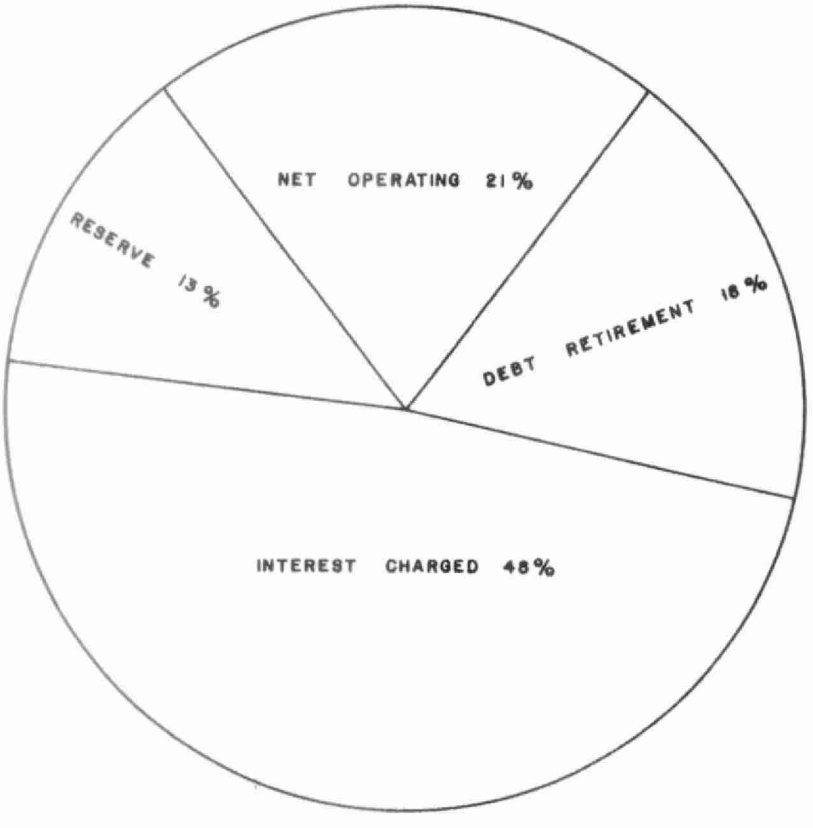
YEAR	M.G. TREATED	TOTAL COST	COST PER FAMILY PER YEAR	COST PER MILLION GALLONS	COST PER L.B. OF BOD REMOVED
1965	149.727	$8109.72	* $ 5.26	$ 54.16	3 CENTS

* BASED ON ANNUAL POPULATION ESTIMATE AND 3.9 PERSONS PER FAMILY

1965 OPERATING COSTS



TOTAL ANNUAL COST



Technical Section

Design-Data

GENERAL

Type of Plant - Extended aeration

Design Population - 3600 persons

Design Plant Flow - 0.5 mgd

Per Capita Flow - 150 gallons per day

Design Strength of Sewage -

200 ppm BOD
170 ppm SS

INFLUENT WORKS

Influent Sewer

24 inch diameter concrete pipe.

Grit Removal

2 chambers each 2 1/2' x 2 1/2' x 25' and each equipped with a proportional weir.

Comminution

1 model 15R Jones & Atwell comminutor driven by a 3/4 HP Brooks electric motor
1 set of coarse bar screens.

Wet Well

1 wet well 11 x 6 x 11 feet with a capacity of 4350 gallons and a retention time of 12 1/2 minutes.

Raw Sewage Pump

1 Worthington 10 MCI centrifugal pump 320 gpm at a 12' TDH powered by a 5 HP Tamper electric motor. The pump is controlled by a float system in the wet well.

Aeration Section

Tanks - two 3 cell tanks each 32' wide x 96' long x 10' deep.
Total capacity - 372,000 gallons.

Aerators

Ames Crosta Mills type 50 mechanical aerators equipped with Mark I cones. Each tank of 3 aerators is driven by a 20 HP Brooks electric motor.

Final Sedimentation

Two tanks 36 ft. x 36 ft. x 9 ft. designed to accommodate a Type S-8 mechanism as manufactured by Dorr-Oliver-Long Ltd.

Capacity each tank - 72,700 gallons
Detention (one tank) - 3.5 hours
Surface settling (one tank) - 387 gals. per square foot per day.
Weir overflow (one tank) - 38,000 gals. per linear foot per day.
Drive Unit - 1/2 HP English electric motor.

Note: Only one of above tanks is equipped with a mechanism. The second is temporarily utilized as a sludge holding tank with a capacity of 11,680 cubic feet.

Return Sludge Pumps

1-4" LMC4 horizontal centrifugal by Chicago Pump.
260 gpm at 12 ft. TDH
Driven by 1 1/2 HP Lincoln electric motor.

2-4" LMC4 horizontal centrifugal by Chicago Pump.
400 gpm at 12 ft. TDH
Driven by 5 HP Lincoln electric motor in combination with Reeves variable belt drive which varies RPM of pump from 400 to 1200 RPM.

Sludge Transfer Pump

One Simplex plunger pump by Chicago pump.
40 gpm at 30 ft. TDH.
Driven by 3 HP US electric motor.

Process Water Pump

One 2" x 1 1/2" horizontal centrifugal by Chicago pump.
85 gpm at 95 ft. TDH.
Driven by 5 HP Marathon electric motor.

Flow Meter

90° V-notch weir in conjunction with a Foxboro transmitter receiver and recorder.

Chlorinator

Wallace & Tiernan V-notch gas chlorinator type A-731, max. cap. 400 lbs/day.
Discharge points - effluent
- by-pass
- aeration
- wet well

Willow Street Pumping Station

2 - 4" vertical centrifugal by Chicago pump each having a capacity of 750 gpm at 35 ft. TDH.
Driven by 16 HP Lincoln electric motor.

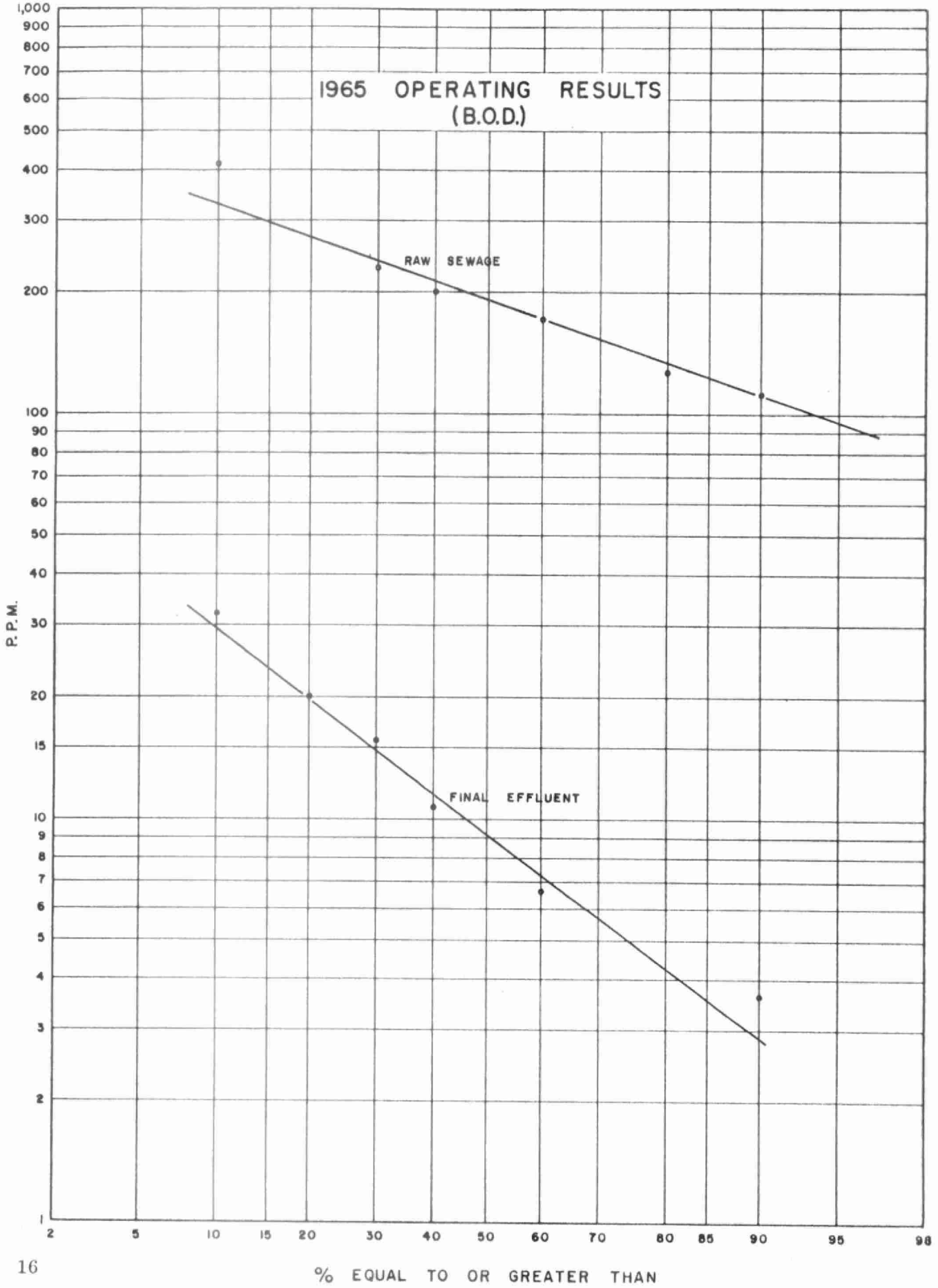
One pump equipped with 16 HP Wisconsin gas engine through a Johnson right angle drive.

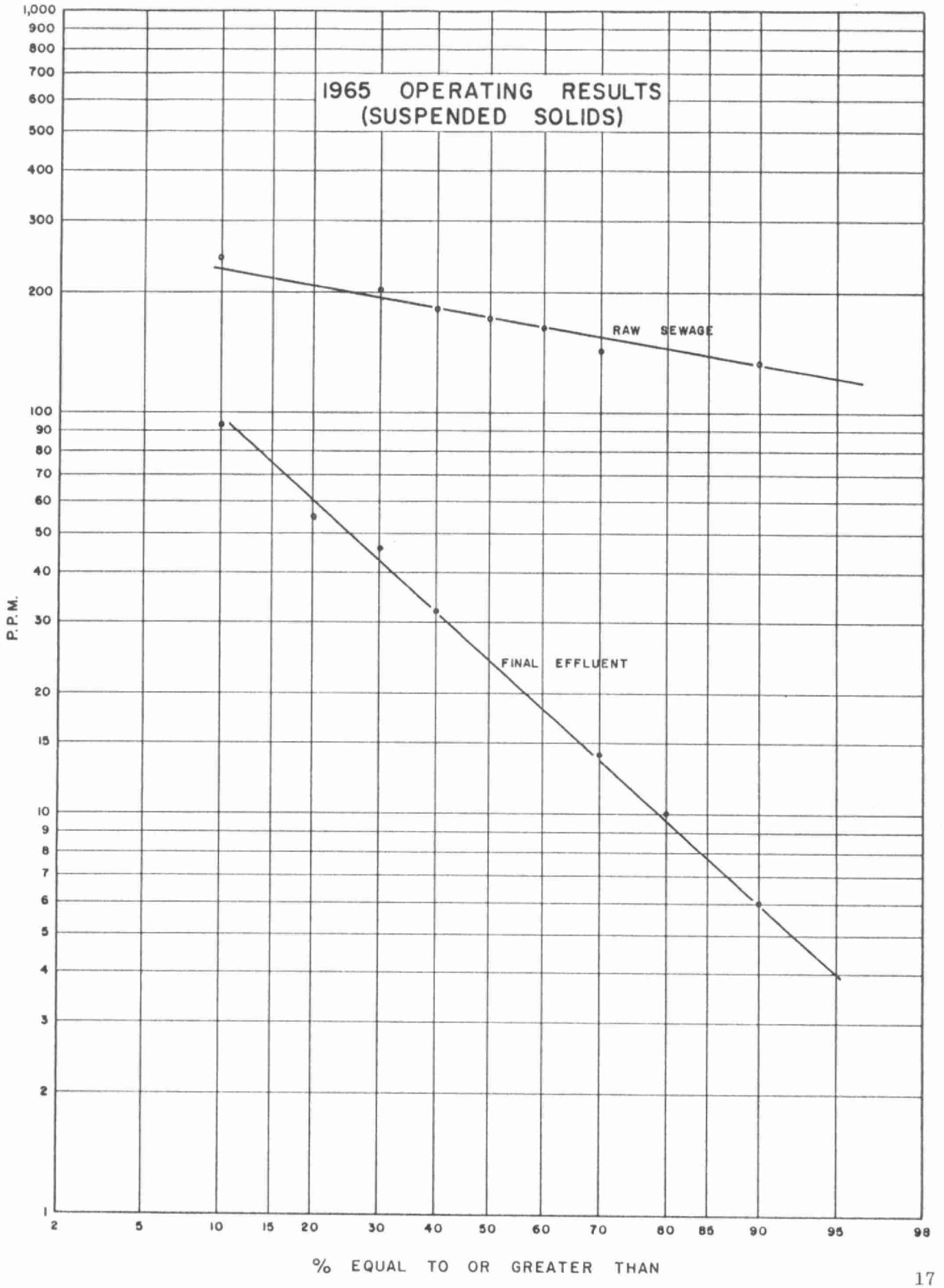
Coarse bar screening is provided to sewage.

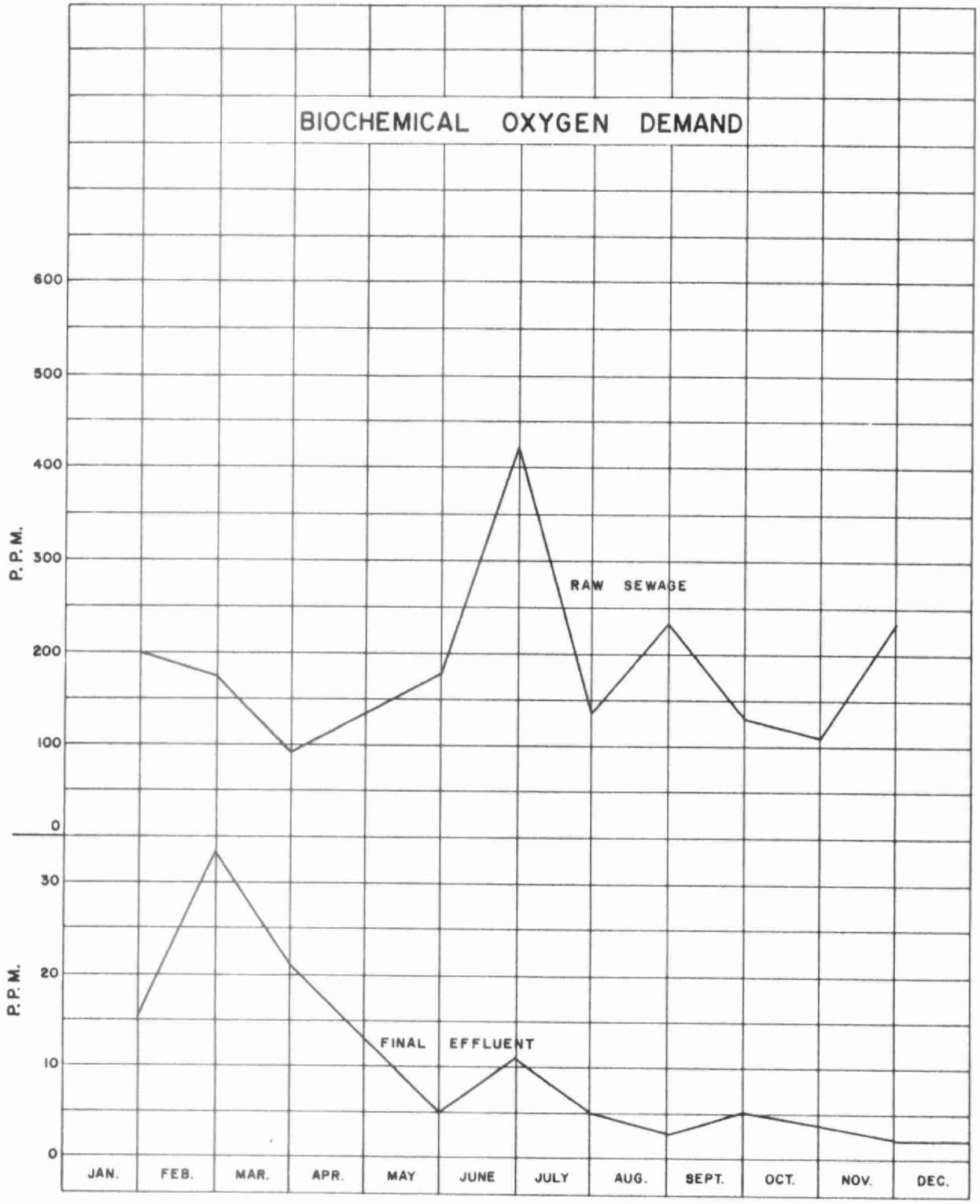
Process Data

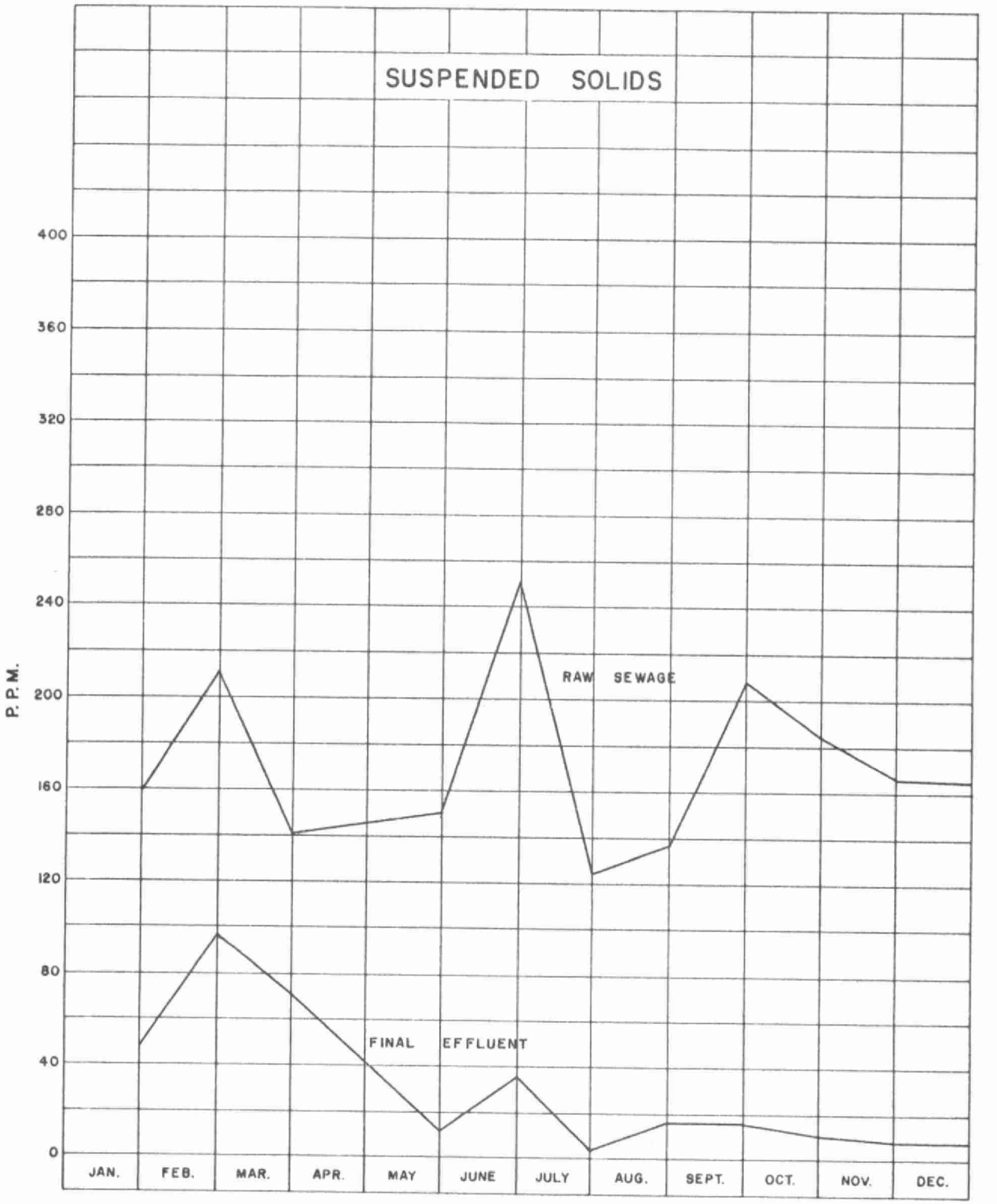
A total of 149.727 million gallons of sewage was treated at the plant in 1965. The average daily flow for the year was 410,000 gpd which represents 82% of the design flow. The maximum monthly flow occurred in December and the minimum flow occurred in July.

The average strength of the raw sewage for the year was 190 ppm BOD and 174 ppm SS which represent 95% and 102% of design strengths respectively. The final effluent had an average BOD of 10 ppm and an average SS of 30 ppm. The respective average reductions were 94.5% BOD and 82.5% SS.


1965 OPERATING RESULTS
(B.O.D.)
RAW SEWAGE
FINAL EFFLUENT
P.P.M.
1,000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
15
10
9
8
7
6
5
4
3
2
1
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98
% EQUAL TO OR GREATER THAN


1965 OPERATING RESULTS
(SUSPENDED SOLIDS)
RAW SEWAGE
FINAL EFFLUENT
P.P.M.
1,000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
15
10
9
8
7
6
5
4
3
2
1
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98
% EQUAL TO OR GREATER THAN


BIOCHEMICAL OXYGEN DEMAND
P.P.M.
600
500
400
300
200
100
0
RAW SEWAGE
P.P.M.
30
20
10
0
FINAL EFFLUENT
JAN.
FEB.
MAR.
APR.
MAY
JUNE
JULY
AUG.
SEPT.
OCT.
NOV.
DEC.


SUSPENDED SOLIDS
P. P. M.
400
360
320
280
240
200
160
120
80
40
0
RAW SEWAGE
FINAL EFFLUENT
JAN.
FEB.
MAR.
APR.
MAY
JUNE
JULY
AUG.
SEPT.
OCT.
NOV.
DEC.

FLOWS

BOD and SS Removal

MONTH	B. O. D.				S. S.				FLOW IN M.G.
	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	
JAN.	200	15	92.5	10.6	178	46	74.0	7.6	11.459
FEB.	175	33	81.0	9.4	210	96	54.0	7.3	12.852
MAR.	92	21	77.0	5.1	131	53	59.5	5.6	14.288
APR.	*190	10	94.5	14.0	*174	30	82.5	11.2	15.562
MAY	175	5.2	97.0	10.7	150	13	91.5	8.6	12.585
JUNE	420	11	97.5	25.0	250	36	85.5	13.1	12.218
JULY	135	5	96.0	6.1	124	4	90.5	5.7	9.455
AUG.	230	2.6	99.0	12.9	136	15	89.0	6.9	11.358
SEPT.	130	4.8	96.5	7.2	208	16	92.5	11.0	11.480
OCT.	110	3.6	96.5	6.2	184	10	94.5	10.1	11.570
NOV.	230	2.2	99.0	14.3	166	7	95.5	10.0	12.570
DEC.	*190	10	94.5	12.9	*174	30	82.5	10.3	14.330
TOTAL	-	-	-	134.8	-	-	-	107.8	149.727
AVG.	190	10	94.5	11.2	174	30	82.5	9.0	12.477

* Average values substituted. No samples.

Loadings calculated on a total yearly flow of 149.727 million gallons.

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CONCLUSIONS

With the plant operating at 82% of design capacity, thought should be given to the conversion of the present sludge holding tank into a second final clarifier. The sludge holding tank was initially designed for this purpose. Further experience with flows and sewage strengths should be obtained before a move of this nature is carried out. The conversion will mean replacement of the sludge holding tank and possibly further additions with respect to sludge handling.




ONTARIO WATER RESOURCES COMMISSION